SECTION 2.0: PROPOSED ACTION AND ALTERNATIVES

2.1 INTRODUCTION

EPA (Region 10) proposes to reissue the NPDES general permit (No. AKG285000) for existing source facilities located in Cook Inlet. The proposed permit (No. AKG315000) is included in this EA as Appendix A. Discharges to be authorized by the proposed permit are from facilities regulated under the Coastal and Offshore Subcategories of the Oil and Gas Extraction Point Source Category (40 CFR Part 435 Subparts A and D). The facilities are oil and gas operations associated with wellheads located in Cook Inlet. This section of the EA describes the proposed action (permit reissuance), identifies alternatives addressing the disposal of produced waters, and discusses the No Action Alternative.

2.1.1 Covered Facilities and Nature of Discharges

NPDES general permit (No. AKG285000), which expired April 1, 2004, authorized discharges from exploration, development, and production facilities located north of a line extending across Cook Inlet at the southern end of Kalgin Island. It also authorized discharges from exploration facilities in state and federal waters north of the line between Cape Douglas (at 58° 51' N latitude, 153° 15' W longitude) on the west side of Cook Inlet and Port Chatham (at 59°13' N latitude, 151° 47' W longitude) on the east side (See Figure 2-1).

2.1.1.1 Exploration Facilities

Exploration for hydrocarbon-bearing strata can involve indirect methods, such as geological and geophysical surveys; however, direct exploratory drilling is the only method to confirm the presence and determine the quantity of hydrocarbons that may be present. Jackup rigs, which are barge-mounted drilling rigs with extendable legs that can be used in waters up to 300 feet deep, and semisubmersible units are the most common exploratory drilling facilities likely to be used in Cook Inlet (EPA 1996; MMS 2003). Shallow exploratory wells are typically drilled in the initial phase of exploration to discover the presence of oil and gas reservoirs; deep exploratory wells are usually drilled to establish the extent of the reservoirs (EPA 1996). The major waste streams discharged from exploratory facilities are drilling fluids, drill cuttings, cooling water, sanitary and domestic wastewater, and deck drainage. Exploratory wells are not expected to extract hydrocarbons and therefore have not been authorized for the discharge of produced waters.

MMS (2003) estimated that exploratory well depths in the southern portion of the Cook Inlet outer continental shelf would average 6,000 feet, and that each well would generate approximately 150 dry tons of drilling fluids (muds) and approximately 440 dry tons of drill cuttings for disposal. Exploratory operations were limited to a maximum of five wells per site under the expired NPDES general permit.

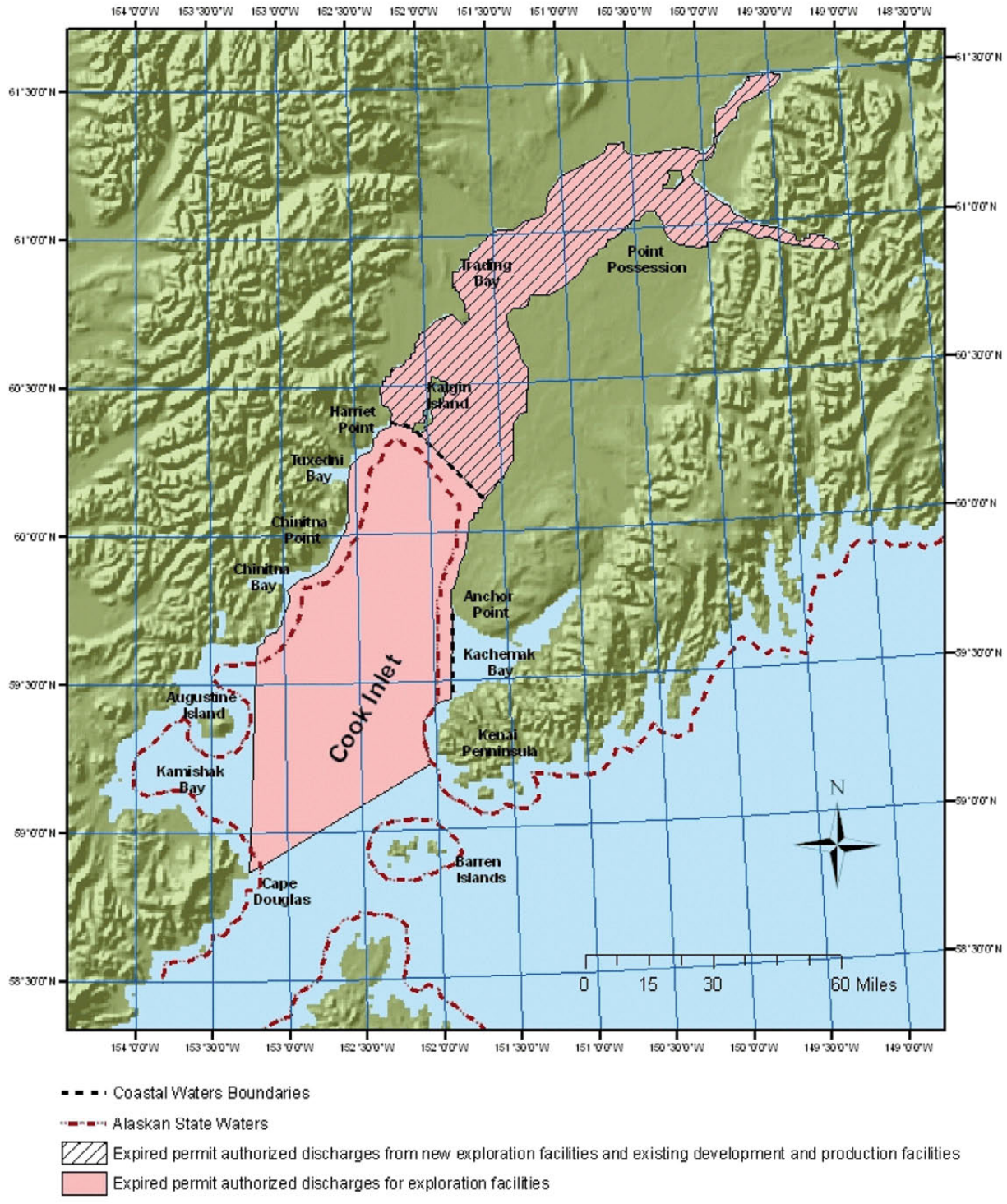

Figure 2-1. Area of coverage of expired NPDES general permit (No. AKG285000)

2.1.1.2 Development Facilities

Development of oil and gas reservoirs requires the drilling of wells into the reservoirs to begin hydrocarbon extraction, increase hydrocarbon production, or to replace wells that are not producing on existing production sites (EPA 1996). Operations are conducted from fixed or mobile facilities. Development wells tend to be smaller in diameter than exploratory wells because the previous information gained from exploratory drilling allows difficulties associated with the geological and geophysical properties of the subsurface strata to be anticipated. Development operations may occur either prior to, or simultaneously with, production operations. Waste streams that are discharged from development operations include those that generally are discharged from exploratory facilities (drilling fluids, drill cuttings, cooling water, sanitary and domestic wastewater, and deck drainage) but can also include produced water.

MMS (2003) estimated that development/production well depths in the southern portion of the Cook Inlet outer continental shelf would average 7,500 feet and that each well would require approximately 75 dry tons of drilling fluids (muds) and generate approximately 550 dry tons of drill cuttings for disposal.

2.1.1.3 Production Facilities

Production operations consist of the active recovery of hydrocarbons from producing reservoirs. Facilities conducting production operations generally are not involved in exploration activities. These facilities typically discharge cooling water, sanitary and domestic wastewater, deck drainage, and produced water.

2.1.1.4 Existing Facilities

Eighteen facilities were active during the 5 year period from April 1, 1999 through April 1, 2004 and subject to the expired NPDES general permit within the area of coverage in Cook Inlet, Alaska (Table 2-1). Other facilities that were covered by the permit included three exploratory drilling wells (Fire Island, Sturgeon, Sunfish), Steelhead blowout relief well, and the North Forelands platform.

Oil and gas are extracted from numerous wells associated with production and development platforms. Oil is generally produced in emulsion with water and must be separated from the water. Gas is generally produced with significantly less water than is associated with oil production. There are various ways in which oil and gas are separated from the produced water. Some of the production platforms are equipped to separate oil and gas from produced water onboard and discharge produced water directly to Cook Inlet. Other production platforms perform initial oil/water separation and route their produced water to onshore facilities (Granite Point, Trading Bay, and East Foreland) for further treatment. In these cases, produced water is discharged from the onshore facility. Under the expired NPDES general permit, produced water is an authorized discharge from the following facilities: Granite Point Production Facility, Trading Bay Treatment Facility, East Forelands Treatment Facility, and platforms Anna, Baker, Bruce, Platform A (Tyonek), Cross Timbers Platform A, Cross Timbers Platform C, and Spark.

Table 2-1. Cook Inlet, Alaska, NPDES General Permit No. AKG285000 Active Facilities

NPDES Permit No.	Facility name	Operator
AKG285001	Granite Point Production Facility	Unocal
AKG285002	Trading Bay Treatment Facility	Unocal
AKG285003	East Foreland Treatment Facility	XTO Energy
AKG285004	Platform Anna	Unocal
AKG285005	Platform Baker	Unocal
AKG285006	Platform Bruce	Unocal
AKG285007	Platform Dillon	Unocal
AKG285008	King Salmon Platform	Unocal
AKG285009	Dolly Varden Platform	Unocal
AKG2850010	Spark Platform	Marathon
AKG2850011	Platform A (Tyonek Platform)	Phillips
AKG2850012	Cross Timbers Platform A	XTO Energy
AKG2850013	Cross Timbers Platform C	XTO Energy
AKG2850014	Spurr Platform	Unocal
AKG2850015	Granite Point Platform	Unocal
AKG2850016	Grayling Platform	Unocal
AKG2850017	Monopod Platform	Unocal
AKG2850019	Steelhead Platform	Unocal

Occasionally, operators may decide to stop platform operations, ceasing production and subsequent discharges for some period of time. These facilities may resume production and discharging during the effective period of the permit. At this time, the platforms Baker, Dillon, Spurr, and Spark have ceased operations and, with the exception of deck drainage, are not discharging.

2.1.2 Options Development and Screening Process

The technology-based limitations for drilling fluid discharges in the Existing Permit were based on the effluent limitations guidelines (ELGs) establishing NSPS and BAT for Cook Inlet. The

ELG development process included an evaluation of land-based disposal options. An additional evaluation of requiring reinjection of drilling fluids and cuttings resulting in zero discharge of these waste streams was conducted by EPA and was determined to be technically infeasible for many of the formations underlying and adjacent to Cook Inlet. Therefore, the Proposed Permit retains the Existing Permit's limitations with a few minor changes. The Proposed Permit does not authorize discharges of drilling fluids from New Sources.

2.1.3 Alternatives Identification

The following sections describe the proposed project and alternatives for the reissuance of the NPDES general permit for oil and gas extraction facilities in federal and state waters in Cook Inlet, Alaska. Brief descriptions of the alternatives are listed below; they are described in detail in Sections 2.2, 2.3, and 2.4.

2.1.3.1 Proposed Action (Alternative 1)

The proposed general permit would maintain many of the provisions in the expired NPDES general permit (No. AKG285000) for existing source facilities located in Cook Inlet. Proposed changes to the expired NPDES general permit that would be part of the proposed general permit are listed below:

- The permit number for the NPDES general permit is proposed to be changed from AKG285000 to AKG315000.

- The area of coverage for the general permit is proposed to be expanded to include the area in southern Cook Inlet under MMS lease sales 191 and 199 and the adjoining territorial sea (via State lease sales). The proposed NPDES general permit would also authorize discharges from development, exploration, and production facilities in that area as well as in the existing area of coverage in northern Cook Inlet (Figure 2-2).

- Although EPA does not, at this time, propose to authorize the discharge of produced water, drilling fluids, or drill cuttings from new development and production facilities, other discharges from those "new source" facilities are proposed to be authorized. Discharges from new source facilities that are proposed to be authorized include sanitary wastewater, domestic wastewater, deck drainage, and miscellaneous discharges such as cooling water and boiler blowdown. Discharges associated with the use of synthetic-based drilling fluids from exploration facilities are also proposed to be authorized in offshore subcategory waters. Offshore subcategory waters include the federal waters and territorial seas in Cook Inlet waters located south of Kalgin Island (Figure 2-2).

- The expired permit's prohibition on discharge within 1,000 meters of sensitive areas will be expanded to 4,000 meters in the proposed general permit.

- New sheen monitoring requirements are proposed for produced water discharges. If a sheen is observed in the vicinity of the discharge, operators will be required to collect and analyze a produced water sample for compliance with the oil and grease limitations.

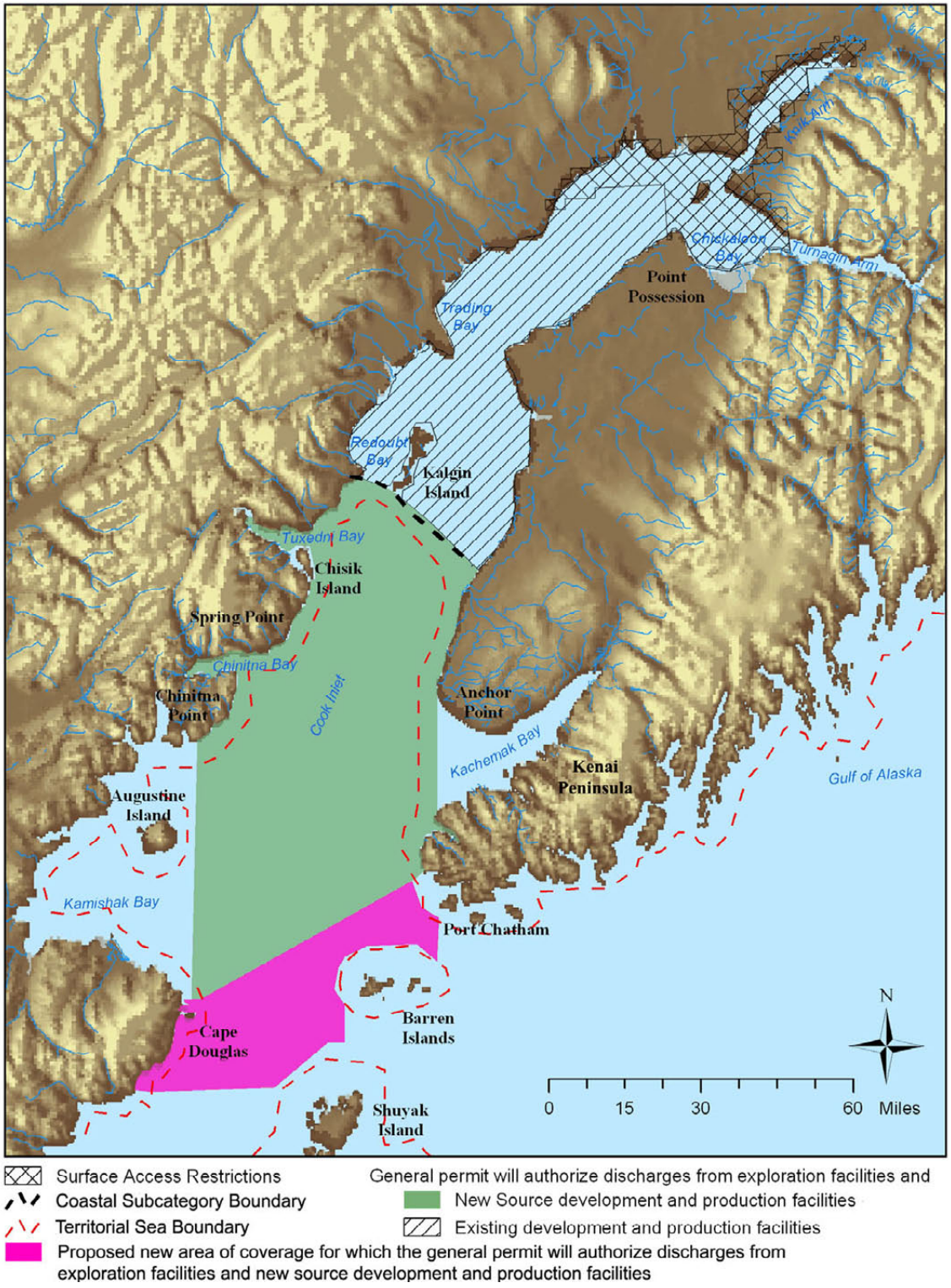

Figure 2-2. Area of coverage of proposed new NPDES general permit (AKG315000)

- Water quality-based limits under the expired permit have been reexamined using current dispersion modeling practices, the use of mixing zones proposed by the Alaska Department of Environmental Conservation (ADEC), and Ocean Discharge Criteria. The proposed permit will have new whole effluent toxicity limitations for discharges to which treatment chemicals, such as biocides and corrosion inhibitors, are added; chemically treated seawater discharges can include water flood wastewater, cooling water, boiler blowdown, and desalination unit wastewater.

- Technology-based limits would be proposed for the treatment chemicals that are added to waterflood and other miscellaneous discharges

- Changes to the permit's monitoring frequency requirements are also proposed. The changes would result in increased monitoring for discharges that violate the permit's limitations. Correspondingly, the required monitoring frequency is proposed to be decreased for those discharges that demonstrate a good record of compliance with the permit's limits.

- A new water quality-based limit for Total Residual Chlorine will be added to the general permit.

- The expired general permit's baseline study requirement is proposed to be expanded to include all new facilities.

- A new study is proposed that will involve the collection of ambient data to analyze the fate of large-volume produced water discharges.

2.1.3.2 Alternative 2

The area of coverage of the general permit under this alternative would be expanded and be identical to that of Alternative 1. All provisions of the NPDES general permit would be identical to Alternative 1 except for the following:

- Produced water discharges at existing facilities in upper Cook Inlet, which are currently authorized under the expired NPDES permit subject to an Oil and Grease monthly average limit of 29 mg/L and a daily maximum limit of 42 mg/L, would not be allowed. All produced water from both existing and new source facilities would be reinjected into subsurface geological formations.

2.1.3.3 Alternative 3

The area of coverage of the general permit under this alternative would be expanded and be identical to that of Alternative 1. All provisions of the NPDES general permit would be identical to Alternative 1 except for the following:

- The discharge of produced waters would be allowed for new sources (new development and production facilities) but only in waters greater than 10 meters in depth. Discharges would be subject to the current oil and grease monthly average, and daily maximum limits, and the

proposed new procedures for monitoring sheens would be applied to all produced water discharges.

2.1.3.4 Alternative 4: No Action

Under this alternative, the area of coverage of the expired general permit would remain the same. All provisions in the new general permit would be identical to the expired NPDES permit (No. AKG285000) except for the following:

- The permit number for the NPDES general permit would be proposed to be changed from AKG285000 to AKG315000.
- Discharges from new development and production facilities in lower Cook Inlet would not be authorized.
- The new area corresponding to MMS lease sales 190 and 191 would not be added to the area of coverage.

2.2 PROPOSED ACTION (ALTERNATIVE 1)

The Proposed Action (Alternative 1) consists of the reissuance of the NPDES general permit that authorizes discharges from oil and gas extraction facilities engaged in exploration, development and production activities under the Offshore and Coastal Subcategories of the Oil and Gas Extraction Point Source Category (40 CFR 435 Subparts A and D).

2.2.1 Area of Coverage

The expired general permit authorized discharges from exploratory oil and gas extraction facilities in Cook Inlet north of a line extending between Cape Douglas (58° 51' N latitude, 153° 15' W longitude) and Port Chatham (59° 13' N latitude, 151° 47' W longitude) (Figure 2-1). Development and production facilities were authorized to discharge only in the northern (coastal) portion of this area of coverage. This is the area north of a line extending across the Inlet at the southern edge of Kalgin Island (Figure 1-1).

The area of coverage for the reissued general permit for the Proposed Action (Alternative 1) will include the areas covered by the expired permit. In addition, the area of coverage will expand southward in the lower portion of Cook Inlet to the northern edge of Shuyak Island (Figure 2-2). The expanded area of coverage includes areas under the Minerals Management Service lease sales 191 and 199 and the adjoining state waters (Figure 1-2).

2.2.2 Restricted Areas

The proposed general permit will contain restrictions and requirements to ensure that unreasonable degradation, as defined by the Ocean Discharge Criteria (40 CFR 125, 121), will not occur. Restrictions and prohibited areas of discharge are listed below:

- No discharges in water depths less than 5 meters (mean lower low water [MLLW] isobath) for all facilities.

- Exploration facilities are prohibited from discharging in waters less than the 10 meter MLLW isobath.

- No discharges in Kamishak Bay west of a line from Cape Douglas to Chinitna Point.

- No discharges in Chinitna Bay inside of the line between the points of the shoreline at latitude 59°52'45" N, longitude 152°48'18" W on the north and latitude 59°46'12" N, longitude 153°00'24"W on the south.

- No discharges in Tuxedni Bay inside of the lines on either side of Chisik Island:

    - from latitude 60°04'06" North, longitude 152°34'12" W on the mainland to the southern tip of Chisik Island (latitude 60°05'45" N, longitude 152°33'30" W).

    - from the point on the mainland at latitude 60°13'45" N, longitude 152°32'42" W to the point on the north side of Snug Harbor on Chisik Island (latitude 60°06'36" N, longitude 152°32'54" W.

- In Shelikof Strait, south of a line between Cape Douglas on the west (latitude 58°51' N, 153°15' W) and the northenmost tip of Shuyak Island on the east (latitude 58°37' N, 152°22' W)

- Minerals Management Service Lower Kenia Peninsula deferral area and Barren Island Deferral area, including the area between the deferral areas and the shore

- No discharges within 20 nautical miles of Sugarloaf Island as measured from a center point at latitude 58° 53' N and longitude 152° 02' W

- Shoreward of the 5.5 meter isobath adjacent to either (1) the Clam Gulch Critical Habitat Area (Sales 32, 40, 46A, and 49) or (2) from the Crescent River northward to a point one-half mile north of Redoubt Point (Sales 35 and 49)

- No discharges within the boundaries of, or within 4,000 meters of, a coastal marsh (the seaward edge of a coastal marsh is defined as the seaward edge of emergent wetland vegetation), river delta, river mouth, designated as Area Meriting Special Attention (AMSA), state game refuge (SGR), State Game Sanctuary (SGS) or Critical Habitat area (CHA), or National Parks. Areas meeting the above classifications within the proposed area of coverage include:

Palmer Hay Flats SGR	Kachemak Bay CHA
Kalgin Island CHA	Lake Clark National Park

Susitna Flats SGR	Goose Bay SGR
Anchorage Coastal Wildlife Refuge	Clam Gulch CHA
Port Graham/Nanwalek AMSA	McNeil River SGS
Trading Bay SGR	Redoubt Bay CHA
Potter Point SGR	

2.2.3 Traditional Ecological Knowledge

During the development of this EA and the draft permit, EPA facilitated the collection of traditional ecological knowledge (TEK) from Cook Inlet area tribes. EPA included excerpts from the report prepared about this TEK in the EA, and has considered it in the development of the draft permit. The following paragraphs summarize the interview responses.

Numerous interviewees from multiple villages adjacent to Cook Inlet expressed consistent observations and concerns. In general, these concerns fit into two main categories: (1) the potential for environmental impacts from catastrophic events such as oil spills (especially considering the age of the platforms and associated pipelines) and (2) the effects from routine platform operations that include the discharge of contaminants. Tribal members frequently noted an overall decline in the population of important food species and in the quality of the species being caught or harvested. These changes include salmon with thinner and less firm meat and smaller halibut with chalky and fibrous meat. In addition, tribal members noted a disappearance in bull kelp and a decrease in the abundance of clams, cockles, bidarkis, cod, flounder, crab, shrimp, mussels, algae, seals, and sea lions.

Clams and mussels were observed to have thinner and sometimes transparent shells. Furthermore, tribal members observed a higher incidence of red tide that has resulted in a decrease in the community's ability to collect traditional food, including shellfish and octopus. Tribal members also observed a decrease in the number of sea ducks, such as mergansers and scoters.

A number of tribal members noted finding lesions, growths and deformities on fish. Some tribal members noted that noncommercial fish, such as hooligans and stickelbacks, have declined in numbers; thus, Fact Sheet for Cook Inlet General Permit (AKG-31-5000) Reissuance Page 46 of 77 indicating that commercial and recreational fishing are not the sole causes for the observed decline in population.

The tidal variations in Cook Inlet create a very high energy environment with strong currents. Tribal members noted that mixing pools near Kalgin Island and the mouth of Kachemak Bay result from the tidal currents and cause settling of detritus in those areas. Despite the strong currents, interviewees observed that Cook Inlet is a fairly closed marine system. While Cook Inlet water is carried north and south by strong tides, there is no a mechanism to move contaminants out of Cook Inlet. Because of those characteristics, a number of tribal members observed a potential for pollutants to accumulate in Cook Inlet over time. On the basis of that information,

the tribes suggested that EPA make an effort to learn more about the fate of pollutants discharged from oil and gas operations in Cook Inlet.

It is important to note that during the interviews opposition to oil and gas development was not evident, but rather there was an overall desire to ensure that oil and gas activities did not affect the health of Cook Inlet natives, traditional foods, or the environment. In fact, in numerous interviews, the interviewees acknowledged that observations made through Traditional Ecological Knowledge could not be directly attributed to oil and gas activities. However, there was a strong sense that the stress from multiple pollution sources, including oil and gas operations affected the health of Cook Inlet natives, traditional foods, and the environment. The impact on tribes include traveling farther to collect food and the inability to obtain a sufficient quantity of traditional food. Because a significant portion of a tribal member's diet consists of seafood from Cook Inlet, there is increasing concern regarding the impact on health from contaminants that may accumulate in seafood and the affect of eating lower-quality fish. This fear has led some parents to stop feeding their children traditional foods.

Some TEK interviewees made comments expressing their lack of confidence in the monitoring that operators have conducted on oil platforms and questioned how well the existing permit's requirements were actually being enforced. In addition, several interviewees requested that the public be continuously informed regarding platform reporting and compliance. To help meet these objectives, the proposed permit would impose the following requirements:

- Revisions to the setback distances for discharges from exploratory facilities. The existing permit prohibited the discharge of drilling fluids and drill cuttings within 1,000 meters of sensitive areas, such as coastal marshes. As described in the draft fact sheet, the proposed permit would expand the discharge prohibition to 4,000 meters.

- The proposed permit would not authorize discharges of produced water, drilling fluids, and drill cuttings from new sources.

- The proposed permit would establish new limits on both the amount of treatment chemicals added, and toxicity, for discharges such as water flood wastewater and cooling water.

- The proposed permit would establish more stringent limits for total residual chlorine.

- The proposed permit would require two new studies to gain a better understanding of the potential impacts of the discharges. Specifically, it would require operators of all new facilities installed during the proposed permit to conduct baseline monitoring. The proposed permit would also include ambient monitoring requirements for large-volume produced water discharges. Operators would be required to collect sediment and water column samples to determine the ambient pollutant concentration in the vicinity of the discharges.

A comprehensive compliance program is a critical component of an effective permit. EPA will continue to fairly employ the four principles of compliance assurance (i.e., compliance assurance, compliance incentives, compliance monitoring, and enforcement) for the proposed permit and

will identify and implement additional ways to involve and respond to inquiries from the tribes and the public.

2.2.4 Technology-Based Permit Requirements

Technology-based limitations and conditions are included in the draft general permit as required under federal regulation (Effluent Limitations Guidelines, 40 CFR Part 435, Subparts A and D). These guidelines establish best practicable control technology currently available (BPT), best conventional pollution control technology (BCT), best available pollution control technology economically achievable (BAT), and new source performance standards (NSPS) for the offshore and coastal subcategories of the Oil and Gas Point Source Category. The limitations and monitoring requirements for the individual waste streams that would be authorized by the general permit for this alternative are described below.

2.2.4.1 Drilling Fluids

Drilling fluids are complex mixtures of clays, barite, and specialty additives used primarily to remove rock particles (cuttings) from the hole created by the drill bit and transported to the surface. Other functions include cooling and lubricating the drill bit and controlling formation pressures. As the hole becomes deeper and encounters different geological formations, the type of fluid, or the fluid composition, may need to be changed to improve drilling performance.

The technology-based limits for drilling fluids in the expired general permit would be included in the reissued permit. Discharges of drilling fluids from new source facilities would not be authorized by this permit. Federal guidelines for the discharge of drilling fluids in offshore and coastal waters establish limits that are required throughout Cook Inlet. On the basis of those guidelines, limits and prohibitions for the proposed general permit (applicable to existing platforms) include:

- No discharge of free oil.
- No discharge of diesel oil.
- A minimum toxicity limit of 3 percent by volume.
- Cadmium and mercury in stock barite, which is added to drilling fluids, are limited to 3 mg/kg and 1 mg/kg, respectively.
- No discharge of nonaqueous-based drilling fluids, also known as synthetic-based drilling fluids in Territorial Seas and federal waters, except those that adhere to drill cuttings as described below in section 2.2.3.2.
- No discharge of oil-based drilling fluids, inverse emulsion drilling fluids, oil-contaminated drilling fluids, and drilling fluids to which mineral oil has been added.

Free oil in drilling fluids discharges is to be measured using the static sheen test method. Toxicity is measured with a 96-hour LC_{50} on the suspended particulate phase using the

Leptachoirus plumniosus species. Cadmium and mercury are measured using EPA Methods 245.5 or 7471 on the stock barite prior to adding it to drilling fluids. These BAT- and NSPS-based limits apply to drilling fluids discharges throughout the draft general permit's area of coverage.

2.2.4.2 Drill Cuttings

Drill cuttings are the waste rock particles that are brought up from the well hole during drilling operations. During typical operations, a mixture of cuttings and drilling fluid returns to the surface between the drill pipe and the bore hole. At the surface the cuttings and fluid are separated, and the cuttings are either saved for analysis or disposed of by discharge into adjacent waters. The main source of pollutants in drill cuttings are associated with the drilling fluids that adhere to the rock particles.

The technology-based limits in the expired general permit for drill cuttings for exploratory facilities will be included without modification in the reissued general permit. No discharge of cuttings will be authorized for new source development and production facilities.

The limits and prohibitions proposed for the general permit for the proposed project include:

- No discharge of free oil associated with cuttings discharges.
- No discharge of drill cuttings generated using drilling fluids that are oil contaminated or contain diesel oil or mineral oil.
- Cadmium and mercury in stock barite, which is added to drilling fluids, are limited to 3 mg/kg and 1 mg/kg, respectively.
- The toxicity of suspended particulate phase of drilling fluids is limited to 30,000 ppm.

While the discharge of nonaqueous-based drilling fluids will be prohibited under the proposed permit (see Section 2.2.3.1), the discharge of drill cuttings that are generated using nonaqueous-based drilling fluids is proposed to be authorized by the reissued permit. These new discharges are only proposed to be authorized in the territorial seas and federal waters in Cook Inlet. Nonaqueous-based drilling fluids, also known as synthetic-based fluids, are a pollution prevention technology because the drilling fluids are not disposed of through bulk discharge at the end of drilling. Instead, the drilling fluids are brought back to shore and refurbished so that they can be reused. Drilling with synthetic-based fluids allows operators to drill a slimmer well and causes less erosion of the well during drilling than drilling using water-based fluids. Therefore, relative to drilling with water based fluids, the volume of drill cuttings that are discharged is reduced.

Limitations on the discharge of nonaqueous-based drilling fluids associated with cuttings are based on the Effluent Limitations Guidelines for the Oil and Gas Extraction Point Source Category (see 40 CFR Part 435, Subpart B). New limits are proposed for both the stock synthetic-based fluids added to drilling fluids and those drilling fluids that adhere to discharged drill cuttings. Limits that are proposed to be applied to stock base fluids include polynuclear

aromatic hydrocarbons (PAH), sediment toxicity (10-day), and the biodegradation rate. Prior to its use, the drilling fluid is also limited for formation oil contamination, measured using Gas Chromatography/Mass Spectrometry (GC/MS). Drilling fluids that adhere to drill cuttings and are discharged are limited for: sediment toxicity (4-day), formation oil contamination as measured by either a reverse phase extraction test or GC/MS, and base fluids that are retained on discharged drill cuttings.

2.2.4.3 Produced Water

The term "produced water" refers to the water brought up from the oil-bearing subsurface geologic formations during the extraction of oil and gas; it can include formation water, injection water, and any chemicals added to the well hole, or added during the oil/water separation process (EPA 1996).

All the existing development and production facilities in Cook Inlet are in coastal waters in the area north of a line extending across Cook Inlet at the southern edge of Kalgin Island (Figure 1-1). Federal guidelines for the coastal subcategory of oil and gas extraction point source category allow produced waters to be discharged to Cook Inlet coastal waters provided these discharges meet a monthly average oil and grease limit of 29 mg/L and a daily maximum oil and grease limit of 42 mg/L. These limits are contained in the expired general permit for produced water and will be included without modification, for existing facilities only, in the reissued general permit.

Produced waters will not be authorized for discharge in either coastal or offshore waters for new sources. Federal regulations define the term "new source" for the oil and gas extraction point source category. For Offshore Subcategory facilities (facilities in Territorial Seas or Federal Waters), NSPS were promulgated on March 4, 1993(58 FR 12454,Mar. 4, 1993). For Coastal Subcategory facilities (those located in Coastal Waters), NSPS were promulgated on December 16, 1996 (61 FR. 66125, December 16, 1996). In simple terms, a "new source" with regard to produced waters, is a development/production facility or onshore treatment facility, that was constructed after issuance of New Source Performance Standards.

The proposed general permit will include a new produced water sheen monitoring requirement that was not part of the expired general permit. Under this requirement, operators of existing facilities will observe the receiving water down-current of the produced water discharge once per day to see if there is a visible sheen. If a sheen is observed, operators will then be required to collect and analyze a produced water sample for compliance with the oil and grease limit. Observations will be required to be made during slack tide so that the turbulence, which can be present during periods of high ambient velocity, does not interfere with the ability to see a sheen. Observation of a sheen will not be required at times when conditions, such as sea ice, make it difficult to see a sheen.

2.2.4.4 Produced Sand

The term "produced sand" refers to slurried particles that are the accumulated formation sands and scale particles generated during oil and gas production (EPA 1996). It also includes de-sander discharge from the produced water waste stream and blowdown of the water phase from the produced water treating system.

The expired general permit prohibited the discharge of produced sand based on NSPS, BAT, and BCT established by the Offshore Subcategory Effluent Limitations Guidelines. This restriction would be included without modification in the reissued general permit.

2.2.4.5 Well Treatment, Completion and Workover Fluids

The term "well treatment fluids" refers to any fluid used to restore or improve the productivity of a well by chemically or physically altering the oil-bearing subsurface geologic formations (strata) after a well has been drilled (EPA 1996). Well completion fluids are salt solutions, weighted brines, polymers, and various additives used to prevent damage to the well bore during operations that prepare the drilled well for hydrocarbon production (EPA 1996). Workover fluids are salt solutions, weighted brines, polymers, or other specialty additives used in a producing well to allow safe repair and maintenance or abandonment procedures (EPA 1996).

Federal guidelines for NSPS and BAT (40 CFR 435.15) for the offshore category of oil and gas extraction point sources require monthly average oil and grease limits of 29 mg/L and a daily maximum oil and grease limit of 42 mg/L for well treatment, completion, and workover fluids. A BCT ELG limit of no free oil discharge is also required for these discharge categories. These limits for produced water are contained in the expired general permit and will be included without modification in the reissued general permit.

2.2.4.6 Deck Drainage

The term "deck drainage" refers to any waste resulting from deck washings, spillage, rainwater, and runoff from gutters and drains, drip pans, and work areas (EPA 1996). Federal guidelines for NSPS, BAT, and BCT for the offshore and coastal subcategories of the oil and gas extraction point source category require no discharge of free oil for this discharge category. The proposed general permit also includes new requirements for stormwater discharges for the existing onshore production facilities for the stormwater discharge requirements, see Section 2.2.3.11.

2.2.4.7 Sanitary Waste

The term "sanitary waste" refers to human body waste discharged from toilets and urinals located within facilities subject to the general permit (EPA 1996).

The offshore and coastal subcategory ELGs for NSPS and BCT require residual chlorine to be maintained as close to 1 mg/L as possible for facilities continuously manned by 10 or more persons. The ELGs also require no discharge of floating solids for offshore facilities continuously manned by nine or fewer persons or intermittently manned by any number of persons.

The expired general permit specified a maximum Total Residual Chlorine limit of 19 mg/L and a minimum requirement of 1 mg/L. The proposed general permit will specify a maximum Total Residual Chlorine limit of 2 mg/L and maintain the existing minimum requirement of 1 mg/L for facilities located in territorial seas. The proposed general permit will specify a maximum Total Residual Chlorine limit of 13.5 mg/l and a minimum of 1mg/l only for facilities in coastal waters.

The expired general permit also included water quality based limits for biochemical oxygen demand (BOD), and total suspended solids (TSS). The proposed general permit would maintain the existing effluent limitations for these parameters in coastal waters and Territorial Seas.

2.2.4.8 Domestic Waste

The term "domestic waste" refers to materials discharged from sinks, showers, laundries, safety showers, eyewash stations, and galleys within facilities subject to the general permit (EPA 1996).

Federal guidelines for NSPS, BAT, and BCT for the offshore and coastal subcategories of oil and gas extraction point sources require no discharge of floating solids or foam for this discharge category. This limit is contained in the expired general permit and will be included without modification in the reissued general permit.

2.2.4.9 Miscellaneous Discharges

Miscellaneous discharges that were authorized by the expired general permit include: desalination wastewater, blowout preventer fluid, boiler blowdown, fire control system test water, noncontact cooling water, uncontaminated ballast water, bilge water, excess cement slurry, muds, cuttings, and cement at the sea floor, and waterflooding wastewater. Brief definitions (EPA 1996; 63 FR 211) of these discharges are provided below:

- desalination wastewater–wastewater associated with the process of creating fresh water from seawater
- blowout preventer fluid–fluid used to actuate hydraulic equipment on the blowout preventer
- boiler blowdown–discharge of water and minerals drained from boiler drums
- fire control system test water–water released during the training of personnel in fire protection and the testing and maintenance of fire protection equipment
- noncontact cooling water–seawater that is sometimes treated with biocide, used for noncontact, once-through cooling of crude oil, produced water, power generators, and various other pieces of machinery
- uncontaminated ballast water–tanker or platform ballast water, either local seawater or fresh water, from the location where the ballast water was pumped into the vessel
- bilge water–seawater that becomes contaminated with oil and grease and solids such as rust when it collects at low points in the bilges
- excess cement slurry–excess mixed cement, including additives and wastes from equipment washdown, after a cementing operation

- muds, cuttings, cement at sea floor–materials discharged at the surface of the ocean floor in the early phases of drilling operations, before the well casing is set, and during well abandonment and plugging

- waterflooding discharges–discharges associated with the treatment of seawater or produced water prior to its injection into a hydrocarbon-bearing formation to improve the flow of hydrocarbons from production wells. These discharges include excess injection water and backwash from strainers and filtering systems.

The expired general permit limited these miscellaneous discharges by requiring no free oil discharges, as monitored by the Visual Sheen Test method. Discharges of uncontaminated ballast water and bilge water were required to be treated in an oil-water separator. Bilge water discharges were required to be sampled for free oil using the static sheen test method when discharges occurred during broken, unstable, or stable ice conditions. As noted above in section 2.2.3.3, the proposed general permit also contains a new sheen monitoring requirement for produced water discharges. However, the proposed general permit does not require the use of the static sheen methods during times when storms or ice make observation of a sheen difficult. NPDES permittees were also required to maintain a precise inventory of the type and quantity of chemicals added to water flood, noncontact cooling water, and desalinization wastewater discharges.

Federal guidelines for the offshore and coastal subcategories of oil and gas extraction point sources for this discharge category are not available. The limitations and monitoring requirements described above for the expired general permit are proposed to be included without modification, except as described below in Section 2.2.3.10, in the reissued general permit.

2.2.4.10 Chemically Treated Sea Water Discharges

A broad range of chemicals to treat sea water and fresh water are used in offshore oil and gas operations; the available literature shows more than 20 biocides are commonly used. Those include derivations of aldehydes, formaldehyde, amine salt, and other compounds. The toxicity of those compounds to marine organisms, as measured with a 96-hour LC_{50} test, varies substantially (0.4 mg/L to greater than 1,000 mg/L). The scale inhibitors commonly used are amine phosphate ester and phosphonate compounds. Scale inhibitors are generally less toxic to marine life than biocides with 96-hour LC_{50} concentrations shown to be from 1,676 mg/L to greater than 10,000 mg/l. Corrosion inhibitors are generally more toxic to marine life with 96-hour LC_{50} values for corrosion inhibitors reported to range from 1.98 mg/l to 1,050 mg/l.

The discharge of specific biocides, scale inhibitors, and corrosion inhibitors is not proposed to be limited in the reissued general permit. Due to the large number of chemical additives used, it would be very difficult to develop technology-based limits for each individual additive. Also, if the permit were to limit specific chemicals it could potentially halt the development and use of new and potentially more beneficial treatment chemicals that would not be specifically listed in the permit and for which discharge would not be authorized. An additional reason for not specifying biocides is that the field conditions for each producing well can change and require different treatment over the life of the permit. Instead, chemically treated sea water discharges will be limited on the basis of the following requirements:

- The concentrations of treatment chemicals in discharges of sea water or fresh water will be limited to the most stringent of the following: 1) the maximum concentrations and any other conditions specified in the EPA product registration labeling if the chemical additive is an EPA-registered product; 2) the maximum manufacturer's recommended concentration when one exists, or 3) a maximum of 500 mg/L.

The Proposed Permit contains BCT limits prohibiting the discharge of free oil for chemically-treated seawater and freshwater discharges

2.2.4.11 Stormwater Runoff from Onshore Facilities

The proposed general permit would include new requirements for existing onshore production facilities. Operators of the onshore facilities will be required to develop and implement Storm Water Pollution Prevention Plans pursuant to CWA § 402(l)(2) and 40 CFR § 122.26(c). These plans will include best management practices implemented to monitor and maintain operations to prevent contamination of stormwater. These changes will ensure greater consistency between the stormwater requirements of onshore production facilities and those typically required for shore-based industrial facilities.

2.2.4.12 All Discharges

The proposed general permit will prohibit the discharge of rubbish, trash, and other refuse based on the International Convention for the Prevention of Pollution from Ships ("MARPOL"). It will also require that the discharge of surfactants, dispersants, and detergents be minimized based on CWA Section 403(c), 33 USC § 1343(c). The Proposed Permit also prohibits the discharge of sandblasting waste pursuant to 33 C.F.R. Part 151.

2.2.5 Water Quality-Based Permit Requirements

The proposed general permit establishes water quality-based limitations and monitoring requirements necessary to ensure that the authorized discharges comply with Alaska's Water Quality Standards and with federal Ocean Discharge Criteria (40 CFR Part 125, Subpart M and Section 403 of the Clean Water Act).

2.2.5.1 Alaska State Water Quality Standards

Section 301(b)(1)(C) of the Clean Water Act, 33 USC § 1311(b)(1)(C), and 40 CFR Part 122.44(d)(1) require that NPDES permits contain the limitations and conditions which are necessary to attain state Water Quality Standards. The expired general permit contained limits based on State Water Quality Standards for metals, hydrocarbons, and toxicity in produced water discharges. Using updated mixing zone computations described below, the expired permit's Water Quality Standards based limitations are proposed to be recalculated. In addition, new limits for whole effluent toxicity on miscellaneous discharges to which treatment chemicals have been added are proposed. The industry uses treatment chemicals such as biocides, corrosion inhibitors, and oxygen scavengers in a number of discharges such as cooling water and waterflood wastewater. Many of those chemical additives have been shown to be highly toxic. To ensure that those discharges comply with the requirements of both State Water Quality

Standards and Ocean Discharge Criteria, whole effluent toxicity limitations are included in the proposed general permit.

Mixing zones are established by states and EPA to specify a limited the portion of a waterbody in which otherwise applicable water quality criteria may be exceeded. In coastal waters and Territorial Seas, states typically have the authority to define mixing zones and determine their size. Chronic aquatic life and human health criteria are limited on the basis of the calculated critical dilution at the edge of the mixing zone. In general, criteria to protect aquatic life from acute toxic effects of discharges are required to be met at the edge of a smaller mixing zone called the zone of initial dilution. The zone of initial dilution is typically intended to further restrict the portion of the waterbody that is acutely toxic to aquatic life. Alaska's Water Quality Standards specify that acute water quality criteria are met at the edge of a smaller initial mixing zone (see 18 ACC 70.255(d)). Aquatic life will tend to pass through a smaller zone of initial dilution fairly rapidly and, due to the short exposure time, acute toxic affects of the discharged pollutant will be minimized. Chronic aquatic life criteria and human health criteria are based on longer term exposure of aquatic life to pollutants. Thus, mixing zones are larger than zones of initial dilution and allow for a longer exposure time.

Alaska's Water Quality Standards do not allow mixing zones to be used unless they are authorized by ADEC. When they are authorized, the standards require that they are as small as practicable (see 18 ACC 70.240). The state regulations found at 18 AAC 70.245 require that in determining the appropriateness and size of a mixing zone, the existing uses of the waterbody must be fully protected and maintained. Numeric water quality criteria are used to measure attainment of Water Quality Standards. Although the standards allow numeric criteria for chronic aquatic life and human health protection to be exceeded within the mixing zone, they must be met at its boundary. The standards (18 AAC 70.255) also require that the smaller initial mixing zone must be sized to prevent lethality to passing organisms and that acute aquatic life criteria are met at the boundary of a smaller zone of initial dilution established within the mixing zone.

Alaska's Water Quality Standards do not allow ADEC to authorize mixing zones if the pollutants could bioaccumulate or persist in concentrations above natural levels in the environment or if they can be expected to cause a carcinogenic or other human health risk. ADEC is required to take into account the potential exposure pathways in determining whether to authorize mixing zones. ADEC has determined that the discharges authorized by the previous permit are not likely to persist in the environment and, therefore, has authorized mixing zones. Mixing zones ranging in size from 20 to 1,420 meters from the discharge point have previously been authorized by the state for Cook Inlet oil and gas facilities.

EPA developed a draft permit based on state established mixing zones based on current discharge rates and pollutant concentrations reported by the operators in their NPDES permit applications. That permit was submitted to ADEC on August 19, 2005. ADEC adopted new mixing zones based on industry's revised application and submitted that information to EPA in its draft 401 certification on November 2, 2005. As calculated by industry, those new mixing rates are based on the maximum projected discharge rates. A comparison of ADEC's August 19th and November 2nd mixing zones as well as those used to establish the previous permit's limits is shown in Table 2-2.

Table 2-2. Proposed and Previous Mixing Zone Radii (meters)

Facility	Total Aromatic Hydrocarbons (TAH)/Total Aqueous Hydrocarbons (TAqH)		Acute metals		Chronic metals		Whole-effluent toxicity	
	Proposed	Previous	Proposed	Previous	Proposed	Previous	Proposed	Previous
Granite Point (Onshore)	2,685	955	19	20	21	66	780	20
Trading Bay	2,418 [a]	1,420	<1 [b]	42	9 [c]	431	31 [d]	59
East Foreland	1,794	412	142	20	121	106	1,742	20
Tyonek A	36	20	36	20	60	663	73	46
Anna	2,734	363	239	20	262	37	274	40
Bruce	1,840	867	201	20	218	31	715	58
Baker	3,016	555	202	22	216	37	248	20
Dillon	2,121	405	11	20	13	43	210	20
Granite Point (Platform)	1,863	None	12	None	14	None	533	None

a Mixing zone will be 5,791 m initially. Unocal will reduce the mixing zone to 2,418 m by installing a diffuser on a two year compliance schedule.

b Mixing zone will be 124 initially. Unocal will reduce the mixing zone to <1 m by installing a diffuser on a two year compliance schedule.

c Mixing zone will be 760 initially. Unocal will reduce the mixing zone to 9 m by installing a diffuser on a two year compliance schedule.

d Mixing zone will be 804 initially. Unocal will reduce the mixing zone to 31 m by installing a diffuser on a two year compliance schedule.

The new mixing zones in the proposed general permit are, in most cases, larger than those previously authorized by ADEC. The main reasons for these larger mixing zones are that a more conservative model was used in the mixing zone applications for this proposed permit (CORMIX versus Plumes) and mixing zones were established for reasonable worst case conditions.

The proposed general permit includes a new requirement for a diffuser on the Trading Bay discharge. The Trading Bay discharge is significantly greater in volume than the other discharges that will be authorized under this general permit. The discharge is also in fairly shallow water and is much nearer to a sensitive area (the Trading Bay State Game Refuge) than any other produced water discharge in Cook Inlet. Therefore, EPA has determined that additional controls are needed for the Trading Bay produced water discharge.

By dividing the effluent and discharging it through a number of separate ports, a diffuser can greatly increase mixing. Through more efficient mixing, the size area of the mixing zone can be

greatly reduced. The Trading Bay discharge was examined for a number of discharge velocities, diffuser lengths, and ambient current speeds to determine a diffuser design that is technically feasible and would result in the smallest mixing zone. As a result of coordinated efforts between ADEC, industry, and EPA, a diffuser has been designed for the Trading Bay discharge that will reduce the mixing zone length from 3,642 meters to 100 meters under most ambient current conditions. Under conditions representative of very low current speeds, the mixing zone with a diffuser will be 1,554 meters. Because mixing zones were established using reasonable worst case conditions, the mixing zone approved by ADEC for Trading Bay is 1,554 meters. This much smaller mixing zone will help to ensure that any potential effects from the discharge are greatly minimized. A compliance schedule is included in the proposed permit and affords the permittee 2 years to design, construct, and install the diffuser.

All mixing zones were derived using conditions representative of a reasonable worst case scenario. ADEC used the CORMIX dispersion model to calculate the dilution the effluent plume receives and determine where the discharges would meet Water Quality Standards. The discharges were examined for a variety of conditions. The current speed at which the discharges were modeled was found to have the most significant effect on mixing. For a single port discharge, the worst case scenario was generally found to exist at high current speeds. The worst case scenario for a discharge made through a multiple-port diffuser was found to exist at low current speeds. That difference between single port discharges and diffusers is caused by changes in the receiving water dynamics created by the discharge made through a diffuser. A diffuser discharge is typically made at a high velocity through a number of ports. The diffuser line and the multiple discharges made from a diffuser cause localized instability of the currents.

At high current speeds, that instability results in a very high degree of mixing relative to a discharge made through a single port. The mixing is less when current speeds are lower; however, better mixing at low current speeds can be achieved by increasing the diffuser length. For the Trading Bay discharge, at diffuser of approximately 100 meters in length. That diffuser will accommodate a high degree of mixing at both low and high current speeds.

The number of dilutions calculated for the different produced water discharges are shown below in Table 2-3. The dilutions, calculated by CORMIX were used to derive the numeric Water Quality Standards based limits shown in Appendix B.

Table 2-3. ADEC Calculated Dilutions

Facility	TAH/TAqH		Acute metals		Chronic metals		Whole-effluent toxicity	
	Mixing Zone (m)	Dilutions	Mixing Zone (m)	Dilutions	Mixing Zone (m)	Dilutions	Mixing Zone (m)	Dilutions
Granite Point (Onshore)	2,685	7,756	19	32	21	36	780	1,638
Trading Bay	2,418 [a]	1,970	<1 [b]	20	9 [c]	183	31 [d]	346
East Foreland	1,794	2,556	142	65	121	55	1,742	1,476
Tyonek A	36	176	36	179	60	277	73	327
Anna	2,387	12,509	197	599	262	666	274	701
Bruce	1,447	9,170	130	496	218	551	715	2,625
Baker	3,016	15,668	202	151	216	168	248	210
Dillon	2,121	3,386	11	24	13	26	210	358
Granite Point (Platform)	1,863	7,756	12	32	14	36	533	1,638

a Mixing zone will be 5,791 initially. Unocal will reduce the mixing zone to 1,554 m by installing a diffuser on a two year compliance schedule.

b Mixing zone will be 124 initially. Unocal will reduce the mixing zone to 9 m by installing a diffuser on a two year compliance schedule.

c Mixing zone will be 988 initially. Unocal will reduce the mixing zone to 31 m by installing a diffuser on a two year compliance schedule.

d Mixing zone will be 83 initially. Unocal will reduce the mixing zone to <1 m by installing a diffuser on a two year compliance schedule.

2.2.6 Monitoring Requirements

Monitoring requirements for authorized discharge categories are described below.

2.2.6.1 Drilling Fluids and Drill Cuttings

The monitoring requirements for the discharge of drilling fluids and drill cuttings for the proposed general permit are specified in Table 2-4.

In addition to the requirements shown in Table 2-4, the permittee must maintain a precise chemical inventory of all constituents added downhole, including all drilling fluid additives used to meet specific drilling requirements. The permittee must maintain these records for each fluid system for a period of 5 years and make these records available to the EPA upon request.

Table 2-4. Effluent Limitations and Monitoring Requirements for Drilling Fluids and Drill Cuttings

Discharge	Pollutant Parameter	Effluent Limitation		Monitoring Requirements	
		Average Monthly Limit	Maximum Daily Limit	Measurement Frequency	Sample Type
Water-based fluids and cuttings	Suspended Particulate Phase toxicity [note 1]	Minimum 96-hour LC_{50} of 30,000 ppm		Monthly and End-of-Well	Grab
	Drilling fluids	No discharge [note 2]		Daily	Grab
	Free oil	No discharge [notes 3 & 4]		Daily	Visual
	Diesel oil	No discharge		Daily	Grab
	Mercury	1 mg/kg [note 5]		Once per well	Grab
	Cadmium	3 mg/kg [note 5]		Once per well	Grab
	Total Volume [note 2]	Report		Monthly	Estimate
	Depth Dependent Discharge Rate [note 3] 0 to 5 meters >5 to 20 meters >20 to 40 meters >40 meters	 No discharge 500 bbl/hr 750 bbl/hr 1,000 bbl/hr		Continuous during discharge	Estimate
Nonaqueous fluids	Drilling fluids	No discharge		Daily	Observation
Nonaqueous stock base fluid (C_{16}-C_{18} internal olefin, C_{12}-C_{14} ester or C_8 ester)	Mercury	1 mg/kg [note 5]		Annual	Grab
	Cadmium	3 mg/kg [note 5]		Annual	Grab
	PAH [note 6]	mass ratio [note 7] $<1x10^{-5}$		Annual	Grab
	Sediment toxicity	ratio [note 8] <1.0		Annual	Grab
	Biodegradation rate	ratio [note 9] <1.0		Annual	Grab
	Total Volume	Report		Monthly	Estimate

Table 2-4. Effluent Limitations and Monitoring Requirements for Drilling Fluids and Drill Cuttings (Continued)

Discharge	Pollutant Parameter	Effluent Limitation		Monitoring Requirements
		Average Monthly Limit	Maximum Daily Limit	Measurement Frequency
Nonaqueous Drilling Fluids which adhere to drill cuttings (Offshore Subcategory Only)	Free oil	No discharge note 3 and 4	Daily	Grab
	Diesel oil	No discharge	Daily	Grab
	SPP toxicity note 1	Minimum 96-hour LC_{50} of 30,000 ppm	Monthly	Grab
	Sediment toxicity	Drilling fluid sediment toxicity ratio note 10 <1.0	Annual	Grab
	Formation oil	No discharge note 11	Daily	Grab
	Base fluid retained on drill cuttings (C_{16}-C_{18} internal olefin stock note 12)	6.9 g NAF base fluid/100 g wet drill cuttings note 13	Daily note 15	Grab
	Base fluid retained on drill cuttings note 14 (C_{12}-C_{14} ester or C8 ester stock)	9.4 g NAF base fluid/100 g wet drill cuttings note 13	Daily note 15	Grab
	Total Volume	Report	Monthly	Estimate

Footnotes:

1 As determined by the 96-hour suspended particulate phase (SPP) toxicity test. See 40 CFR Part 435, Subpart A, Appendix 1.

2 Report total volumes for all types of operations (exploratory, production and development). See Parts II.B.4.a and II.B.4.b of the permit

3 Maximum flow rate of total fluids and cuttings includes pre-dilutant water; water depths are measured from mean lower low water.

4 As determined by the static sheen test. See 40 CFR Part 435, Subpart A, Appendix 1.

5 Dry weight in the stock barite. Analysis shall be conducted using EPA Methods 245.5 or 7471. The permittee shall analyze a representative sample of stock barite once prior to drilling each well and submit the results with the DMR for the month in which drilling operations commence for the respective well. If the permittee uses the same supply of stock barite to drill subsequent wells, the permittee may submit the same analysis for those subsequent wells.

6 Polynuclear Aromatic Hydrocarbons.

7 PAH mass ratio = [mass (g) of PAH (as phenanthrene)] ÷ [mass (g) of stock base fluid] as determined by EPA Method 1654, Revision A, entitled "PAH Content of Oil by HPLC/UV," December 1992. See part III. D of the permit.

Table 2-4. Effluent Limitations and Monitoring Requirements for Drilling Fluids and Drill Cuttings (Continued)

8 Base fluid sediment toxicity ratio = [10-day LC50 of C16-C18 internal olefin, C12-C14 ester or C8 ester] ÷ [10-day LC50 of stock base fluid] as determined by ASTM E 1367-92 method: "Standard Guide for Conducting 10-day Static Sediment Toxicity Tests with Marine and Estuarine Amphipods," 1992, after preparing the sediment according to the method specified at 40 CFR Part 435, Subpart A, Appendix 3. See Section III.B of the permit.

9 Biodegradation rate ratio = [cumulative gas production (ml) of C16-C18 internal olefin, C12-C14 ester or C8 ester] ÷ [cumulative gas production (ml) of stock base fluid], both at 275 days as determined by ISO 11734:1995 method: "Water quality - Evaluation of the 'ultimate' anaerobic biodegradability of organic compounds in digested sludge-Method by measurement of the biogas production (1995 edition)" as modified for the marine environment. See Section III.C of the permit.

10 Drilling fluid sediment toxicity ratio = [4-day LC50 of C16-C18 internal olefin] ÷ [4-day LC50 of drilling fluid removed from drill cuttings at the solids control equipment] as determined by ASTM E 1367-92 method: "Standard Guide for Conducting 10-day Static Sediment Toxicity Tests with Marine and Estuarine Amphipods," 1992, after preparing the sediment according to the method specified in Appendix A of the permit.

11 As determined before drilling fluids are shipped offshore by the GC/MS compliance assurance method (see Section III.E of the permit), and as determined prior to discharge by the Reverse Phase Extraction (RPE) method (see Section III.F of the permit) applied to drilling fluid removed from drill cuttings. If the operator wishes to confirm the results of the RPE method, the operator may use the GC/MS compliance assurance method (Section III.E of the permit). Results from the GC/MS compliance assurance method shall supercede the results of the RPE method.

12 This limitation is applicable only when the nonaqueous drilling fluid (NAF) base fluid meets the stock limitations defined in this table.

13 As determined by the American Petroleum Institute (API) retort method. See Section III.G of the permit.

14 Averaged over all well sections.

15 Monitoring shall be performed at least once per day when generating new cuttings, except when meeting the conditions of the Best Management Practices described in section V.G. below. Operators conducting fast drilling (i.e., greater than 500 linear feet advancement of the drill bit per day using nonaqueous drilling fluids) shall collect and analyze one set of drill cuttings samples per 500 linear feet drilled, with a maximum of three sets per day. Operators shall collect a single discrete drill cuttings sample for each point of discharge to the ocean. The weighted average of the results of all discharge points for each sampling interval will be used to determine compliance.

2.2.6.2 Deck Drainage and Stormwater Runoff

The monitoring requirements for the discharge of deck drainage and stormwater for the proposed general permit are shown in Table 2-5. In addition, operators of shore-based facilities shall comply with Storm Water Pollution Prevention Plan (SWPPP) requirements. The free oil limits and toxicity testing requirements are not proposed to be changed from those in the expired permit.

The permittee must ensure that deck drainage contaminated with oil and grease is processed through an oil-water separator prior to discharge. Once per discharge event, the permittee must sample deck drainage discharges that are processed through the oil-water separator and test for sheen, total aromatic hydrocarbons (TAH), total aqueous hydrocarbons (TAqH), and polynuclear aromatic hydrocarbons (PAH).

If deck drainage is commingled with produced water, this discharge must be considered produced water for monitoring purposes. However, samples collected for compliance with the produced water oil and grease limits shall be taken prior to commingling the produced water stream with deck drainage or any other wastestream. Monitoring for compliance with the free oil prohibition must be accomplished prior to commingling. The estimated deck drainage flow rate must be reported in the comment section of the discharge monitoring report.

2.2.6.3 Sanitary Wastewater

The monitoring requirements for the discharge of sanitary wastewater for the proposed general permit are shown in Table 2-6.

The term M10, used in Table 2-6, refers to platforms continuously manned by 10 or more persons. The term M9IM refers to platforms continuously manned by 9 or fewer persons or intermittently manned by more persons. Intermittently manned means manned for fewer than thirty consecutive days.

For any facility using a marine sanitation device (MSD), the permittee must conduct annual testing of the MSD to ensure that the unit is operating properly. The permittee must note on the December Discharge Monitoring Report (DMR) the results of the test.

In cases where the sanitary and domestic wastes are mixed prior to discharge and sampling of the sanitary waste component of the discharge is infeasible, the discharge may be sampled after mixing, however, the most stringent discharge limitations for both discharges apply to the mixed wastestream.

Table 2-5. Effluent Limitations and Monitoring Requirements for Deck Drainage and Storm Water Runoff

Effluent Parameter	Units	Effluent Limitations		Monitoring Requirements	
		Average Monthly Limit	Maximum Daily Limit	Sample Frequency	Sample Type
Free oil	---	No discharge note 1		Daily note 2	Visual
Whole effluent toxicity note3	TUc note5	Report		Once during the first year the permittee is covered by the permit note 4	Part III.F.7.b.
Flow	MGD	—		Monthly	Estimated

Footnotes:

1 If discharge occurs during broken or unstable ice conditions, or during stable ice conditions, the Static Sheen Test must be used (see Appendix 1 to 40 CFR part 435, subpart A).

2 When discharging.

3 Contaminated deck drainage must be processed through an oil-water separator prior to discharge and samples for that portion of the deck drainage collected from the separator effluent must be sampled for WET testing.

4 Sample must be collected during a significant rainfall or snow melt. If discharge of deck drainage separate from produced water is initiated after the first year of the permit, sampling must occur during the year following the initiation of separate deck drainage discharge.

5 With the final report for each test, the following must also be reported: date and time of sample, the type of sample (i.e., rainfall or snow melt), estimate of daily flow and basis for the estimate (e.g., turbine meters, monthly precipitation, estimated washdown).

Table 2-6. Effluent Limitations and Monitoring Requirements for Sanitary Wastewater

Discharge	Effluent Parameter	Effluent Limitations		Monitoring Requirements	
		Monthly Avg. Limit	Daily Max. Limit	Sample Frequency	Sample Type
Sanitary Waste Water All Discharges note 2	Flow Rate	Report		1/Month	Estimate
	Total Residual Chlorine	1 mg/l Minimum note 5		1/Month	Grab
	Total Residual Chlorine	7 mg/l note 6		1/Month	Grab
	Floating Solids	No Discharge		1/Day	Observation note 1
M10 MSD and MSD/Biological Treatment Units	BOD note 3	30 mg/l	60 mg/l	1/Month	Grab
	TSS note 3	51 mg/l	67 mg/l	1/Month	Grab

Table 2-6. Effluent Limitations and Monitoring Requirements for Sanitary Wastewater (Continued)

Discharge	Effluent Parameter	Effluent Limitations		Monitoring Requirements	
		Monthly Avg. Limit	Daily Max. Limit	Sample Frequency	Sample Type
M9IM MSD and MSD/Biological Treatment Units	BOD note 3	30 mg/l	60 mg/l	1/Month	Grab
	TSS note 3	51 mg/l	67 mg/l	1/Month	Grab
M10 Biological Treatment Units	BOD note 3	30 mg/l	60 mg/l	1/Month	Grab
	TSS note 3, 4	30 mg/l	60 mg/l	1/Month	Grab
M9IM Biological Treatment Units	BOD note 3	48 mg/l	90 mg/l	1/Month	Grab
	TSS note 3, 4	56 mg/l	108 mg/l	1/Month	Grab

Footnotes:

1 The permittee must monitor by observing the surface of the receiving water in the vicinity of the outfall(s) during daylight at the time of maximum estimated discharge. For domestic waste, observations must follow either the morning or midday meal.

2 In cases where sanitary and domestic wastes are mixed prior to discharge, and sampling of the sanitary waste component stream is infeasible, the discharge may be sampled after mixing. In such cases, the discharge limitations for sanitary wastes must apply to the mixed wastestream.

3 The numeric limits for BOD and TSS apply only to discharges to state waters.

4 The TSS limitation for biological treatment units is a net value. The net TSS value is determined by subtracting the TSS value of the intake water from the TSS value of the effluent. Report the TSS value of the intake water on the comment section of the DMR. For those facilities that use filtered water in the biological treatment units, the TSS of the effluent may be reported as the net value. Samples collected to determine the TSS value of the intake water must be taken on the same day, during the same time period that the effluent sample is taken. Intake water samples must be taken at the point where the water enters the facility prior to mixing with other flows. Influent samples must be taken with the same frequency that effluent samples are taken.

5 Immediately after chlorination.

6 Measured immediately prior to discharging for facilities located in the Territorial Seas.

2.2.6.4 Domestic Wastewater

The monitoring requirements for the discharge of domestic wastewater for the proposed general permit are shown in Table 2-7.

Table 2-7. Effluent Limitations and Monitoring Requirements for Domestic Wastewater

Discharge	Effluent parameter	Effluent limitations		Monitoring Requirements	
		Average monthly limit	Maximum daily limit	Sample frequency	Sample type
Domestic wastewater (004) note 2	Flow rate	Report		1/month	Estimate
	Floating solids	No discharge		1/day note 1	Visual
	Foam	No discharge		1/day	Visual

Footnotes:

1 The permittee must monitor by observing the surface of the receiving water in the vicinity of the outfall(s) during daylight at the time of maximum estimated discharge. For domestic waste, observations must follow either the morning or midday meal.

2 In cases where sanitary and domestic wastes are mixed prior to discharge, and sampling of the sanitary waste component stream is infeasible, the discharge may be sampled after mixing. In such cases, the discharge limitations for sanitary wastes must apply to the mixed wastestream.

In cases where the sanitary and domestic wastes are mixed prior to discharge, and sampling of the sanitary waste component of the discharge is infeasible, the discharge may be sampled after mixing, however, the most stringent discharge limitations for both discharges apply to the mixed wastestream.

2.2.6.5 Miscellaneous Discharges

The monitoring requirements associated with the discharge of miscellaneous categories (desalination unit wastes, blowout preventer fluid, boiler blowdown, fire control system test water, noncontact cooling water, uncontaminated ballast water, bilge water, excess cement slurry, mud, cuttings, cement at the sea floor, and waterflooding, must comply with the following effluent limitations and monitoring requirements shown in Table 2-8.

In addition to the monitoring requirements specified in Table 2-8, permittees must maintain an annual inventory of the quantities and rates of chemicals and biocides that are added to desalination unit wastewater. Each annual inventory must be assembled for the calendar year and submitted to EPA by March 1 of the following year.

Table 2-8. Effluent Limitations and Monitoring Requirements for Miscellaneous Discharges 005–014

Parameter	Effluent limitations		Monitoring requirements	
	Average monthly limit	Maximum daily limit	Sample frequency	Sample type
Flow	Report		Monthly	Estimate
Free oil	No discharge[1]	No discharge[1]	Once/week[note 1]	Visual
Chemical additives	See Section II.E.3 of proposed permit		Monthly	Calculation
Whole effluent toxicity [note 2]	See Section II.E.4 of proposed permit	See Section II.E.4 of proposed permit	Once/quarter	Grab

Notes:

1 Discharge is limited to those times that a visible sheen observation is possible unless the operator uses the static sheen method. Monitoring shall be performed using the visual sheen method on the surface of the receiving water once per week during periods of slack tide when discharging, or by use of the static sheen method at the operator's option. The number of days a sheen is observed must be recorded. For discharges during stable ice, below ice, to unstable ice or broken ice conditions, a water temperature that approximates surface water temperatures after breakup shall be used.

2 Applicable to discharges to which chemical additives have been added.

2.2.6.6 Produced Water and Produced Sand

The monitoring requirements for produced water for existing facilities is shown in Table 2-9. There are no monitoring requirements for produced sand as no discharges are allowed.

In addition to the monitoring requirements shown in Table 2-8, produced waters are required to be analyzed once a month for TAH and TAqH in accordance with analytical requirements cited in Alaska Water Quality Standards (18 AAC 70.020(b)); once a month for ammonia, total copper, total mercury, total manganese, total nickel, and total zinc; and once a quarter for whole effluent toxicity.

The proposed general permit will reduce the monitoring frequency of produced water if the permittee has complied with the water quality-based effluent limitations (WQBELs) (compliance with water quality limits are determined using measured sample results and the application of the dilution factors shown in Table 2-3 for the mixing zones proposed in Table 2-2) for 12 consecutive months. If compliance is achieved for 12 consecutive months the monitoring frequency of TAH, TAqH, ammonia, total copper, total mercury, total manganese, total lead, total nickel, and total zinc would be reduced to once per quarter; the monitoring frequency for whole effluent toxicity would be reduced to once every 6 weeks.

The proposed general permit will increase the monitoring frequency of produced water if the permittee has not complied with the WQBELs until compliance has been demonstrated for a period of 3 consecutive months. After compliance has been established for 3 months, the required frequency shall return to the default frequency of one sample per month (TAH, TAqH, ammonia, total copper, total mercury, total manganese, total lead, total nickel, and total zinc) or one sample

Table 2-9. Effluent Limitations and Monitoring Requirements for Produced Water and Produced Sand

Parameter	Effluent limitations		Monitoring requirements	
	Monthly average	Daily maximum	Sample frequency	Sample type
Flow rate	Report	Report	1/week	Estimate
Produced sand	No discharge	No discharge		
Oil and grease	29 mg/l	42 mg/l	1/week	Grab[note 1]
pH < 1 MGD	6.0 to 9.0 S.U.		1/month	Grab
pH > 1 MGD	6.0 to 9.0 S.U.		1/week	Grab
Free oil	Report [note 2]		1/day	Visual sheen

Note:

1 The sample type shall be either grab, or a 24-hour composite, which consists of the arithmetic average of the results of four grab samples taken over a 24-hour period. If only one sample is taken for any one month, it must meet both the daily and monthly limits. Samples shall be collected prior to the addition of any sea water to the produced water waste stream.

2 See Section II.G.6.b of the draft permit.

per quarter whole effluent toxicity). The increased monitoring frequency is once per week for TAH, TAqH, ammonia, total copper, total, mercury, total nickel, and total zinc, and once per month for whole effluent toxicity.

2.2.6.7 Fate and Effects Monitoring for Drilling Fluids and Cuttings

The expired general permit required operators of new exploration facilities that were within 4,000 meters of sensitive areas such as a coastal marsh, river delta, or river mouth, or a designated AMSA, State Game Refuge, State Game Sanctuary, Critical Habitat Area, or National Park to conduct baseline monitoring of the fate and effects of drilling fluids and cuttings discharges. There were, however, no new exploration facilities that were within 4,000 meters of sensitive areas, so no baseline monitoring was conducted under the expired permit. To fulfill EPA's requirements under CWA section 403(c), which requires that the potential impacts of permitted discharges be fully understood, additional monitoring is proposed for all new facilities installed after the effective date of the new permit.

2.2.6.8 New Study Requirements

Little ambient data associated with oil and gas discharges in Cook Inlet presently exists. The only available sediment data were collected in the far southern portions of Cook Inlet, well over 100 miles from the existing large-volume produced water discharges. While those data could indicate whether general contamination exists, due to the collection location, there is no way to

draw a connection to the existing produced water discharges. Available ambient water column data relevant to the existing discharges are also extremely limited. Because of the data limitations, EPA has historically relied on tools such as dispersion modeling to analyze the potential effects of discharges for permitting decision making.

As a means to increase available ambient data and ensure that future permit decisions are based on a better body of information, the proposed general permit will require new fate and effects monitoring for large volume produced water discharges. Under this new requirement, operators of produced water discharges greater than 100,000 gallons per day will be required to conduct a sediment and water column sampling study. The goal of the study is to determine if there is a reasonable potential for large-volume produced water discharges to impact sensitive areas of Cook Inlet. To achieve that goal, the permit is proposed to require that operators plan and conduct studies, which at a minimum, would include the collection of both sediment and water column samples at 50 meter intervals over a distance of 2,000 meters between the discharge point and the closest sensitive habitat.

Sediment sampling will be accomplished by a minimum of one box core or similar sample collected at each station. At a minimum, water column monitoring will include collection of a sample from both the mid- and lower-water column at each station. All samples will be analyzed for the metals and hydrocarbons that are limited in produced water discharges. Operators with large-volume produced water discharges will be required to submit a study plan to EPA for approval prior to the commencement of monitoring. Because the studies will be in areas within Alaska State waters, EPA plans to coordinate review of the study plans with ADEC and obtain input as a part of the approval process. Therefore, the plan will also be required to be submitted to ADEC.

Pursuant to the Ocean Discharge Criteria, EPA is required to fully understand the potential impacts to the marine environment of future large volume discharges that may be placed in Cook Inlet. The information obtained from these studies will help EPA comply with the requirements of Ocean Discharge Criteria Evaluations in future permitting actions. In addition, the information will be used by both EPA and ADEC to determine whether any future changes are needed to the permit conditions to meet the requirements of Alaska's Water Quality Standards.

2.3 ALTERNATIVE 2

Under Alternative 2, a general permit that authorizes discharges from oil and gas extraction facilities engaged in exploration, development, and production activities under the Offshore and Coastal Subcategories of the Oil and Gas Extraction Point Source Category (40 CFR 435 Subparts A and D) would be issued for the same area of coverage as under Alternative 1 (see Section 2.2.1) including the same restrictions and limitations for restricted areas specified in Section 2.2.2. All provisions of the general permit would be identical to Alternative 1 except for the following:

- Produced water discharges at existing facilities, which are currently authorized under the existing NPDES permit subject to an Oil and Grease monthly average limit of 29 mg/L and a daily maximum limit of 42 mg/L, would not be allowed.

Thus, under this alternative, no produced water discharges would be allowed for new or existing facilities. All monitoring requirements described in Section 2.2.5 would be required except for those described in Section 2.2.5.6 for produced water. No motoring would be required for produced water because no discharges would be allowed under this alternative. All produced water from both existing and new source facilities would be reinjected into subsurface geological formations.

2.4 ALTERNATIVE 3

Under Alternative 3, a general permit that authorizes discharges from oil and gas extraction facilities engaged in exploration, development and production activities under the Offshore and Coastal Subcategories of the Oil and Gas Extraction Point Source Category (40 CFR 435 Subpart A and D) would be issued for the same area of coverage as under Alternative 1 (see Section 2.2.1) including the same restrictions and limitations for restricted areas specified in Section 2.2.2. All provisions of the general permit would be identical to Alternative 1 except for the following:

- The discharge of produced waters would be allowed for new sources (new development and production facilities) but only in waters greater than 10 meters in depth. Discharges would be subject to the current oil and grease monthly average, and daily maximum limits, and the proposed new procedures for monitoring sheens would be applied to all produced water discharges.

2.5 ALTERNATIVE 4 (No Action)

Under Alternative 4 (No Action), the expired general permit that authorizes discharges from oil and gas extraction facilities engaged in exploration, development, and production activities under the Offshore and Coastal Subcategories of the Oil and Gas Extraction Point Source Category (40 CFR 435 Subparts A and D) would be reissued for the same area of coverage (Figure 1-1), excluding the proposed expansion of the coverage area south of a line extending from Cape Douglas to Port Chatham (Figure 2-1).

Unlike the above alternatives, Alternative 4 would not include the following provisions:

- The expired permit's prohibition on discharge within 1,000 meters of sensitive areas would not be expanded to 4,000 meters.

- The expanded areas associated with the Minerals Management Service lease sales 190 and 191 and adjoining territorial seas would not be added to the area of coverage.

- Changes to the permit's monitoring frequency for discharges that violate the permit's limitations or that meet permit limitations for 12 consecutive months (see Section 2.2.5.6) would not occur.

- New proposed fate and effects monitoring requirements for new facilities that discharge greater than 100,000 gallons per day to conduct a sediment and water column sampling study (see Section 2.2.5.7) would not be required.

- The Total Residual Chlorine maximum water quality limit would remain at 19 mg/L instead of the proposed 7 mg/L for other alternatives.

- The proposed new produced water sheen monitoring requirement (see Section 2.2.3.3) that would require operators of existing facilities to observe the receiving water down-current of the produced water discharge once per day to see if there is a visible sheen, and if observed to collect and analyze a produced water sample for compliance with the oil and grease limit would not be required.

- The proposed new requirements for stormwater discharges from existing onshore production facilities (see Section 2.2.3.11) to develop and implement SWPPPs would not be required.